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**Engineer Research and Development  
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# The Design Review and Checking System (DrChecks)

**Presented by: Annette Stumpf  
(Bill East)**

**Construction Engineering Research Laboratory  
Champaign, Illinois**

# **Design Review and Checking System (DrChecks)**

**A web-based quality control / assurance tool that enables distributed project teams to identify, track, and resolve problems before they impact project scope, cost, or time goals.**



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# DoD “Best Practice” Award

- DrChecks and CLL were recognized by the Dept. of Defense’s Quality Management Office as a DoD “Best Practice.” (Dec. 1999)



# What Does It Do?

- Speeds and improves design process with clients & designers through easy-to-use & standardized process
- Allows reviewers to retrieve and apply relevant comments & lessons
- Helps teams to resolve issues before critical milestones are missed
- Assists managers to pinpoint delinquent project participants



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**CECER DrChecks/CLL Demo** 6/21/99 2:52:30 PM

HOME

Click for menu

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Tech Support

DrChecks Project

Welcome back Mr Bill East. Your last visit was Monday, 21 June 1999.

**You do not appear to have completed the DrChecks Pre-Survey. Please take a moment to complete the survey today. After you finish the survey, you won't see this message again!**

Update Project (help)		Start Date	End Date
Rpt	<a href="#">Roof Repair Building 1106</a>	01-Jun-00	01-Jun-00
Rpt	<a href="#">Whole Neighborhood Revitalization</a>	08-Feb-99	08-Aug-99
Rpt	<a href="#">Barracks Upgrade Program</a>	02-Nov-98	03-Nov-00

[Next](#)

Review Project (Name (help))		Start Date	End Date
Rpt	<a href="#">Roof Repair Building 1106</a>	01-Jun-00	01-Jun-00
Rpt	<a href="#">Whole Neighborhood Revitalization</a>	08-Feb-99	08-Aug-99
Rpt	<a href="#">Barracks Upgrade Program</a>	02-Nov-98	03-Nov-00
Rpt	<a href="#">WCO phase IIIB</a>	01-Jun-98	01-Dec-98

[Next](#)

Design Project Name (help)		Start Date	End Date
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**CECER DrChecks/CLL Demo** 6/21/99 2:52:30 PM

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Tech Support

DrChecks Project

Pick Comment. [Need Help?](#)

**Warning!** The design project is not scheduled to start until 01-Jun-00. **Warning!** The review was scheduled to be finished by 01-Feb-99.

There are a total of 11 comments on the **Concept Review** phase of project **Roof Repair Building 1106**. Your ordering, based on date submitted has returned 11 comments. As a manager you may backcheck any of the comments for any user on this review. The complete set of 11 comments are provided below. Print using the button on the bottom of this page. [Search](#) or [pick](#) again. To find a word on this page CTRL+F and enter your word or ID number!

Sort by: ☐ Specs ☐ Plans ☐ Doc Ref. ☐ Discipline ☐ Author ☒ ID

Spec	Discipline	Sheet	Detail
07600, Flashing and Sheet Metal	Architectural	(not identified)	(not identified)

**140** Ensure that the gauge of the sheet metal is up to standard.  
Submitted by Mr Bill East (voice: 217-352-6511 email: [b-east@cecerc.army.mil](mailto:b-east@cecerc.army.mil)) on 21-May-98 (ID: 140)  
**Designer will check and resolve as noted on 08-Jun-99:**  
Note: This item may impact the project's scope!  
Note: This item may impact the project's final cost!  
Note: This item may impact the project's overall completion time!  
This is an item that the project manager should address due to its scope and schedule impact.  
**Reviewer backcheck agreed on 26-May-98:**  
The A/E Should do something about this item.

Spec	Discipline	Sheet	Detail
07600, Flashing and Sheet Metal	Architectural	(not identified)	(not identified)

**141** Ensure that the gauge of the sheet metal is up to standard.  
Submitted by Mr Bill East (voice: 217-352-6511 email: [b-east@cecerc.army.mil](mailto:b-east@cecerc.army.mil)) on 21-May-98 (ID: 141)  
**Designer non-concured on 28-May-98:**

# How does it work?

The screenshot shows a web application titled "CECER DrChecks/CLL Demo" with a timestamp of 6/21/99 2:52:30 PM. A welcome message for "Mr Bill East" is displayed. A red banner indicates that the user has not completed a pre-survey. The interface features a sidebar menu with options like Home, Help, Account Info, Projects, Reviews, Lessons, Find, and Admin. The main content area displays three tables: "Update Project (help)", "Review Project Name (help)", and "Design Project Name (help)". Each table lists projects with their start and end dates. The "Update Project" table includes "Roof Repair Building 1106", "Whole Neighborhood Revitalization", and "Barracks Upgrade Program". The "Review Project Name" table includes the same three projects plus "WCO phase IIIB". The "Design Project Name" table includes "Roof Repair Building 1106" and "Whole Neighborhood Revitalization". Each table has a "Next" link at the bottom right.

Update Project (help)	Start Date	End Date
Rpt <a href="#">Roof Repair Building 1106</a>	01-Jun-00	01-Jun-00
Rpt <a href="#">Whole Neighborhood Revitalization</a>	08-Feb-99	08-Aug-99
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[Next](#)

Review Project Name (help)	Start Date	End Date
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Rpt <a href="#">WCO phase IIIB</a>	01-Jun-98	01-Dec-98

[Next](#)

Design Project Name (help)	Start Date	End Date
<a href="#">Roof Repair Building 1106</a>	01-Jun-00	01-Jun-00
<a href="#">Whole Neighborhood Revitalization</a>	08-Feb-99	08-Aug-99

[Next](#)

Personalized web pages display work to be accomplished...

- Job to be done
- Project assignment

Empowers communication among team members...

- Reviewer/Designer name, phone, email prominent
- Integrated Lessons Learned & Value Engineering
- Identifies problem issues and delinquent participants



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# Why Is It Effective?

DrChecks is easy to understand...

## Simple business process:

- Manager creates projects
- Reviewers/Clients review
- Managers/Screeners edit
- Designers evaluate comments
- Managers/Reviewers backcheck

## Full On-Line Support:

- On-Line Help, Training Docs.
- Electronic Bulletin Board

CECER DrChecks/CLL Demo 6/21/99 2:52:30 PM

HOME

Click ▶ for menu

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[Tech Support](#)  
[DrChecks Project](#)

Pick Comment. [Need Help?](#)

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Sort by: ☐ Specs ☐ Plans ☐ Doc Ref. ☐ Discipline ☐ Author ☒ ID

Spec	Discipline	Sheet	Detail
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# Why Is It Effective?

DrChecks is easy to use...

## Fast flexible data entry:

- Go directly to needed page
- Enter comments via. Web or import from Word File

## Get Results:

- Print all comments, sort by discipline, sheet, spec, reviewer
- Snapshot report gives full status
- Find & resolve disagreements
- Find scope, cost, time overruns
- Identify delinquent participants

**Your focus remains on quality projects not software features**

90% Review (102 total)								Start: 15-Dec-99 End: 15-Feb-00		
Discipline	Comments		Designer's Actions					Backcheck		
	Total	Withdrawn	Pending	Concur	Check	Info	NonConcur	Closed	Open	
<a href="#">Architectural</a>	58	-	47	1	2	2	6	-	3	
<a href="#">Building Design &amp; Engineering</a>	3	1	2	-	-	-	-	-	-	
<a href="#">Civil</a>	21	-	16	2	1	-	2	-	-	
<a href="#">Construction Security</a>	1	-	1	-	-	-	-	-	-	
<a href="#">Cost Estimator</a>	1	1	-	-	-	-	-	-	-	
<a href="#">Electrical</a>	3	-	2	-	-	-	1	1	-	
<a href="#">Fire Protection</a>	2	-	-	1	-	-	1	-	1	
<a href="#">General</a>	2	-	1	-	-	-	1	-	-	
<a href="#">Geotechnical</a>	2	-	-	1	-	-	1	-	1	
<a href="#">Mechanical</a>	6	-	4	-	-	-	2	-	1	
<a href="#">Other</a>	2	-	2	-	-	-	-	-	-	
<a href="#">Structural</a>	1	-	1	-	-	-	-	-	-	
<b>PM Attention</b>										
<b>Required:</b>										
Impact Scope			Impact Cost			Impact Schedule				
6			6			7				
Manager Reports: <a href="#">All Comments</a> <a href="#">Not Concurred</a> <a href="#">Reviewer Summary</a>										
<a href="#">Detailed Comment Form</a> <a href="#">Reviewers' Comment</a>										
Concept Review (66 total)								Start: 10-Oct-99 End: 01-Dec-99		
Discipline	Comments		Designer's Actions					Backcheck		



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# Why is it effective?

## Agency-specific set-up...

### Customize Overall Site:

- Change program name
- Custom welcome message, footer

### Customize Pick Lists:

- Disciplines
- Project category codes
- Customer codes
- Location codes
- Document type

### Customize Business Process:

- Common business model
- Widely adaptable
- Site status reports provide digital dashboard



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#### Update Site, Part 1 of 1

[HELP](#)

Use the form below to make changes your DrChecks/CLL site. You may include HTML coding in the memo fields. Click the button at the bottom of the page to update your site. You may have to close your browser and re-enter the site to see some changes.

Changes to the data below effects your entire DrChecks/CLL site. Do not use double quotation marks.

1. System Name:

2. Visitor Top Message:

#### Update Disciplines, Part 1 of 1

[HELP](#)

Use the grid below to make changes to the customer code list. When ready, save changes using the buttons below the grid.

Changes to the data below effects all DrChecks/CLL pick list. Do not change items that have already had comments or lessons linked to them. There is no Undo button.

Find Discipline Name:

##### Add Single Discipline:

-	-	Parent	Level	Number	Name	Add
-	-	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="button" value="Add"/>

##### Update Single Discipline:

Delete	ID	Parent	Level	Number	Name	Update
<input type="button" value="Del"/>	1	<input type="text" value="0"/>	<input type="text" value="1"/>	ABF	Architectural	<input type="button" value="Update"/>
<input type="button" value="Del"/>	23	<input type="text" value="0"/>	<input type="text" value="1"/>	ABF	Landscape Architect	<input type="button" value="Update"/>
<input type="button" value="Del"/>	36	<input type="text" value="0"/>	<input type="text" value="1"/>	BDE	Building Design & Engineering	<input type="button" value="Update"/>
<input type="button" value="Del"/>	38	<input type="text" value="0"/>	<input type="text" value="1"/>	CEB	Cost Engineering	<input type="button" value="Update"/>
<input type="button" value="Del"/>	28	<input type="text" value="0"/>	<input type="text" value="1"/>	CEB	Cost Estimator	<input type="button" value="Update"/>
<input type="button" value="Del"/>	40	<input type="text" value="0"/>	<input type="text" value="1"/>	CM	Construction Management	<input type="button" value="Update"/>
<input type="button" value="Del"/>	31	<input type="text" value="0"/>	<input type="text" value="1"/>	COM	Hospital Communications	<input type="button" value="Update"/>
<input type="button" value="Del"/>	3	<input type="text" value="0"/>	<input type="text" value="1"/>	CSB	Civil	<input type="button" value="Update"/>
<input type="button" value="Del"/>	6	<input type="text" value="0"/>	<input type="text" value="1"/>	CSB	Structural	<input type="button" value="Update"/>
<input type="button" value="Del"/>	41	<input type="text" value="0"/>	<input type="text" value="1"/>	CSM	Construction Security	<input type="button" value="Update"/>

# **Corporate Lessons Learned (CLL)**

**is an approach to capture, evaluate, and use lessons learned which is integrated into existing business processes throughout the facility life-cycle.**

**is the web-based software provided free to DrChecks subscribers that supports the capture, evaluation, and application of corporate lessons learned, good work practices, and success stories related to design quality.**



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# What Should a Lessons Learned Program Do?

Turn Project Learning Into Corporate Knowledge...

**Corporate Learning**

**Package and Store**

**Characterize and Understand**

**Set Goals**

**Revise Processes**

**Execute**

Analyze Results

Provide Feedback

*Project-Based Learning*



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# Why hasn't this been done before?



## Problems with previous approaches:

- Lessons lost in handoff between phases
- Difficult to share lessons outside work group
- Difficult to capture dispersed expertise
- Emphasis on negative - success stories missing

## Challenges to effective capture/use of lessons learned:

- Need to support diverse business processes & data types
- Need to eliminate knowledge-management bottlenecks
- Need to include customers and partners
- Access and apply items outside domain/process
- Track use of approved LL to gather metrics of performance



# How Does CLL Work?

## CLL Process

- Capture potential LL
- Validate LL
- Share LL
- Automatic update email

## Who Participates

- Design Professionals
- Program Managers
- Clients & Owners
- Facility Operators



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[HOME](#)  
Click ▶ for menu  
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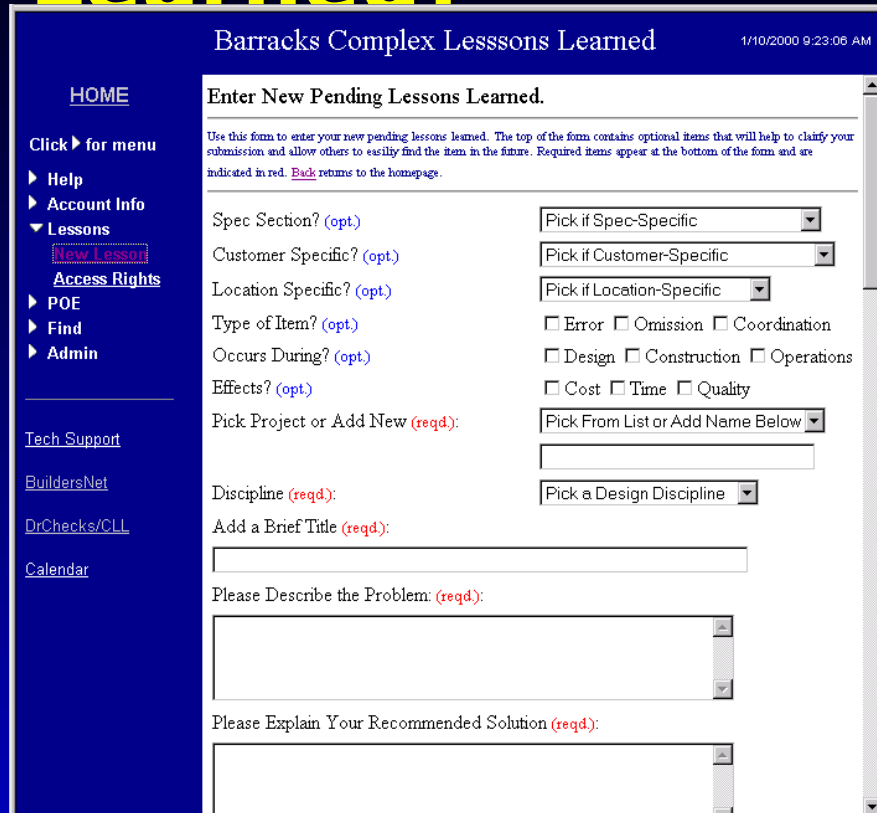
Barracks Complex Lesssons Learned1/10/2000 9:23:06 AM  
Welcome back Mr Bill East. Your last visit was Thursday, 21 October 1999.  
Click a link to access specific submissions in the table(s) below. The number following the lessons learned titles is the unique reference number for each submission.

Evaluate Pending Lessons	Discipline	Submitted (ascending)
<a href="#">Picture Hanging Strips</a> (48)	Architectural	12-Oct-98 > 30 days
<a href="#">Roof Slope</a> (60)	Mechanical	12-Oct-98 > 30 days
<a href="#">Stairs and Travel Distance</a> (31)	Architectural	12-Oct-98 > 30 days
<a href="#">Electrical Receptical Height</a> (34)	Electrical	12-Nov-98 > 30 days
<a href="#">Washing Machine Drainage</a> (43)	Mechanical	12-Nov-98 > 30 days
<a href="#">Wall Corner Guards</a> (44)	Architectural	12-Nov-98 > 30 days
<a href="#">Sidewalk Placement</a> (45)	Architectural	12-Nov-98 > 30 days
<a href="#">Door Locksets</a> (46)	Architectural	12-Nov-98 > 30 days
<a href="#">Door Seeps</a> (47)	Architectural	12-Nov-98 > 30 days
<a href="#">Ceiling Height</a> (54)	Architectural	20-Nov-98 > 30 days

[Next](#)

Review Your Submissions	Submitted (descending)	Status	Updated
<a href="#">Stairs and Travel Distance</a> (31)	12-Oct-98	>30 days	
<a href="#">Vaults</a> (32)	12-Oct-98	Denied	12-Nov-98
<a href="#">Building Signage</a> (40)	12-Nov-98	Approved	12-Nov-98
<a href="#">Electrical Receptical Height</a> (34)	12-Nov-98	>30 days	
<a href="#">Kitchen Range Hoods</a> (35)	12-Nov-98	Approved	12-Nov-98

# How to Capture Lessons Learned?



The screenshot shows a web browser window with the title "Barracks Complex Lessons Learned" and a timestamp "1/10/2000 9:23:06 AM". The page has a blue header and a left sidebar with navigation links: HOME, Click ▶ for menu, Help, Account Info, Lessons (with a sub-link "New Lesson"), Access Rights, POE, Find, and Admin. The main content area is titled "Enter New Pending Lessons Learned." and contains a form with the following fields: Spec Section? (opt.) with a dropdown menu; Customer Specific? (opt.) with a dropdown menu; Location Specific? (opt.) with a dropdown menu; Type of Item? (opt.) with checkboxes for Error, Omission, Coordination, Design, Construction, Operations, Cost, Time, and Quality; Occurs During? (opt.) with a dropdown menu; Effects? (opt.) with a dropdown menu; Pick Project or Add New (reqd.) with a dropdown menu and a text input field; Discipline (reqd.) with a dropdown menu; Add a Brief Title (reqd.) with a text input field; Please Describe the Problem: (reqd.) with a large text area; and Please Explain Your Recommended Solution (reqd.) with a large text area.

## Direct Submission

Design quality issues may be directly entered. Authors provide context information.

## 'Automated' Submission

DrChecks uses yes/no button for users to identify repetitive or critical issues. Context automatically captured.

## What is required of submitter?

- User describes problem
- User prescribes fix

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Picks lists identify context of  
problem  
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# Are Pending Items Evaluated?

## Gatekeeping is vital

- Remove resolved issues
- Remove complainers
- Only approved items visible

## Who Does it?

- Experts already do this
- Specialized by discipline
- May be distributed workforce

## How?

- POC's assigned to discipline
- New items emailed to POC's
- Email links takes POC to page
- Request backup, reassign, or improve



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Barracks Complex Lessons Learned 1/10/2000 9:23:08 AM

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Click ▶ for menu

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Lessons Learned Access Wizard, Part 1 of 2.

Persons responsible for reviewing lessons learned are displayed by discipline. Select one or more persons in a discipline, then click the 'Add >' or '< Del' button to change access.

---

**Architectural**

Not Assigned:		Assigned:
Mr Steve Arbogast	Add >	Mr Goldie Bailey
Mr Ann Barker		Mr Dwight Beranek
Mr Ted Bell		Mr Les Bergen
Mr Robert Billmyre		Mr Thomas Brockbank
Mr John Blewett		Mr Jeff Hooghouse
	< Del	

---

**Civil**

Not Assigned:		Assigned:
Mr Steve Arbogast	Add >	Mr Dwight Beranek
Mr Goldie Bailey		Mr Thomas Brockbank
Mr Ann Barker		Mr Bill Brown
Mr Ted Bell		Mr Larry Delaney
Mr Les Bergen		Mr Jeff Hooghouse
	< Del	

---

**Cost Estimator**

Not Assigned:		Assigned:
Mr Steve Arbogast	Add >	Mr Dwight Beranek
Mr Goldie Bailey		Mr Thomas Brockbank

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# How Are Approved Lessons

## Applied?

Barracks Complex Lessons Learned 1/10/2000 9:23:06 AM

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Click ▶ for menu

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  - Lessons**
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  - [Distribution](#)
  - [CADD Standards](#)
- ▶ Admin

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Find Lessons Learned, Part 1 of 2.

Use this form to find approved lessons learned. Selecting more than one item requires that all the selections be present for a lessons learned to be approved. Enter multiple keywords separated by comma. [Back](#) returns to the homepage.

1. Keywords?

2. Project?

3. Discipline?

4. Location Specific?

4. Spec Section?:

- 01000, General Requirements
- 02000, Site Work
- 03000, Concrete
- 04000, Masonry
- 05000, Metal Materials, Finishes and Fastening
- 06000, Fasteners and adhesives
- 07000, Moisture Protection
- 08000, Doors, Windows, and Glass
- 09000, Finishes
- 10000, Specialties
- 11000, Equipment

This government site is maintained at the [Resource Center Enterprises](#).  
Comments and suggestions to [Jeff Moll](#) or 1-800-428-4357.

## Search & Quick Pick

Barracks Complex Lessons Learned

[HOME](#)

Click ▶ for menu

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  - [CADD Standards](#)
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Would have been wiser to pipe downspouts from roof directly to storm system.

**56 Electrical Communication Closet**

Provide electrical/communication room in individual buildings - very difficult to get all conduit required from one building to the other with limited space which is common between buildings.

**52 Brick/Concrete Pavers**

All brick/concrete paver areas should be bordered by some concrete in lieu of running pavers into edge of landscape bed. Concrete will more positively hold pavers over a longer period of time.

**51 Light Infiltration**

Building occupants have complained of too much light coming into room at night around window blinds. Recommend careful consideration of location of lights (avoid mounting adjacent to a window) and User should be aware of this potential problem if electing not to install curtains.

**50 Sidewalk Placement/Buffer Area**

Recommend providing a sodded buffer between buildings and walkways where beds are especially large, in lieu of just one large landscape bed. The sod will also help keep mulch off walkways after rains.

**59 Utility Tunnel**

Utility tunnel - while a good idea, it major leak occurs - very expensive and severely impacted schedule progress.

**53 Keying**

Consider if card key type door locks are appropriate and are definitely what the User wants. Cards are easier to break and lose than regular keys, and take up more space in soldier's pocket.

**105 Clay Tile Roof**

- Quickly find solvers' name & phone
- Directly apply relevant items
- Use offices & experts 'top-10' list



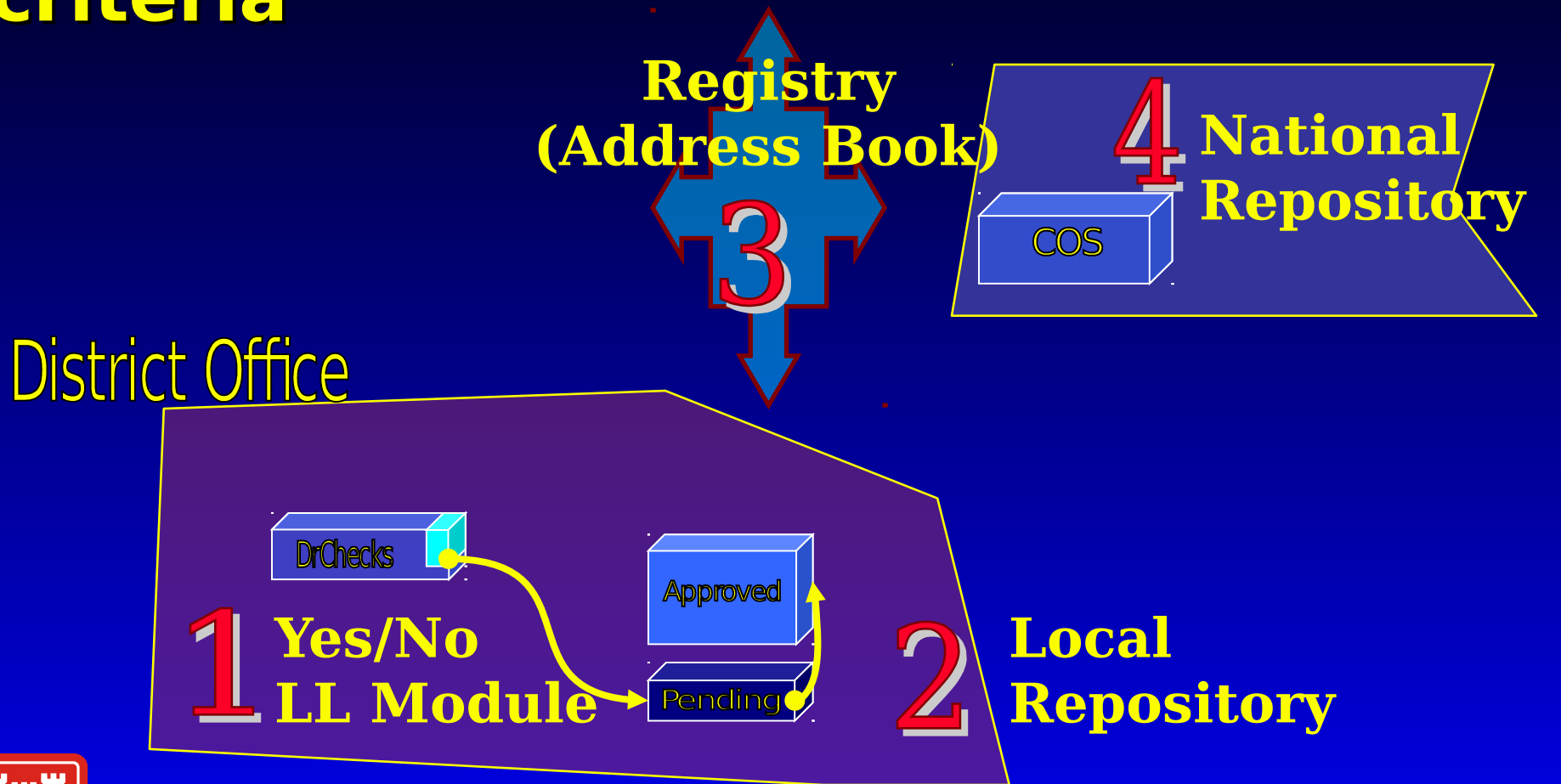
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# National CLL Architecture: Local office location/customer criteria



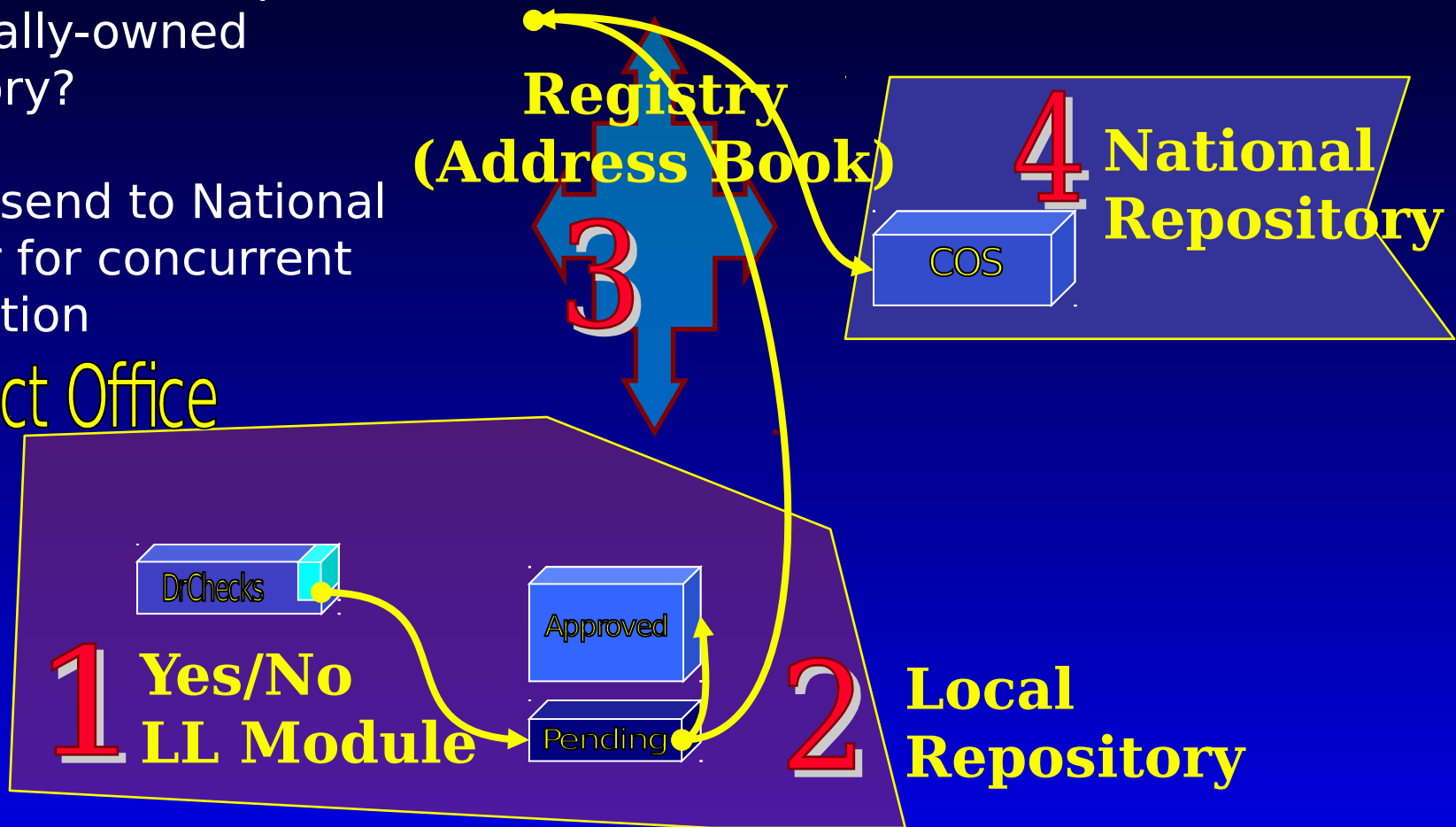
# National CLL Architecture:

## National Center(s) Evaluate Criteria

Does submission pertain to nationally-owned category?

If yes, send to National Center for concurrent evaluation

District Office





# CLL Innovations

## Capture/use integrated within existing software

- Little or no user training
- Capture and use information when needed
- Allows client/customer participation

## Web-based gatekeeping

- Targeted, automated emails, use only when needed
- Web-based repositories
- Free user client software, little or no user training
- Subscriptions support business processes as needed

## Web-based sharing

- Reliable, automated mechanism
- Supports any business processes

## Adaptable Architecture

- Support any business process
- Local and/or national architecture to match problems



# What is the history of

## DrChecks/CLL?

- **Feb '98 Completed R&D Prototype**

Focused on improving design quality by direct capture, evaluation, & application of lessons learned. Two products: DrChecks / CLL.

- **May '98 DrChecks Version 1.0 Operational**  
4 Corps of Engineers Offices
- **Dec '99 Department of Defense Award**  
Quality Management Office "Best Practice" for DrChecks/CLL
- **Jan '00 Cooperative Research and Development Agreement**  
Allows DrChecks to be provided to private sector
- **Feb '00 CLL adopted by Corps of Engineers**  
Integrated approach to be embedded in many automated systems
- **Currently DrChecks Version 2.2 Operational**  
10 Corps of Engineer Districts  
U.S. Dept. of State's Foreign Building Office



# How does my office get

## DrChecks? Single Project Subscription:

- office set-up assistance, one telecon training session
- max. 500 comments, 50 users per year
- 5 toll-free extended support calls per year

## Level 2: Small Office Subscription:

- office set-up assistance, two telecon training sessions
- avg. 500 comments per project
- max. 200 users, 20 projects per year
- 20 toll-free extended support calls per year

## Level 3: Large Office Subscription:

- office set-up assistance, three telecon training sessions
- avg. 500 comments per project
- max. 500 users, 500 projects per year



# Can I count on this service?

## Reliable:

- Commercial components
- 24-7 access via. Application Service Provider (ASP)
- Hourly, daily, weekly backups
- Free < 10 minute technical support calls
- On-line manual, help page

## Low long term cost:

- Supports all computer platforms
- No per-user fees
- Leverage in-house expertise
- Integrated quality improvement
- Large & small organizations



# Who do I call for additional information?

Project Manager

Bill East, CERL 217-373-6710, [b-east@cecer.army.mil](mailto:b-east@cecer.army.mil)

## Federal Government Account Manager

services provided at <http://www.buildersnet.org/>

**Jeff Kirby**, CERL 217-373-6730, [j-kirby@cecer.army.mil](mailto:j-kirby@cecer.army.mil)

## State and Local Government Account Manager

services provided at <http://www.buildersnet.org/>

**Annette Stumpf**, CERL 217-373-6511 x7542,  
[a-stumpf@cecer.army.mil](mailto:a-stumpf@cecer.army.mil)

## Commercial Service Provider

services provided at <http://www.drchecks.com/>

**Jeff Moll**, Resource Center Enterprises, 217-367-3273,  
[jmoll@rcsupport.com](mailto:jmoll@rcsupport.com)



US Army Corps  
of Engineers

<http://www.buildersnet.org> <http://www.drchecks.com>

Engineer Research and Development  
Center